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ABSTRACT

The purposes of this study were to determine (1) whether 3-, 4-, and 5-year-old children can segment words, and (2) whether they can profit from instruction in segmentation. In the first phase of the study, all subjects (N=68) received a 28 word test designed to assess children's performance on four different segmentation tasks. Since the children could not read, test items were illustrated and presented orally with appropriate distractors. In the second phase, children who did not attain the criterion of 80% correct on the pre-test, received instruction in segmentation tasks and a post-test. ANOVAs and post hoc procedures yielded the following results: significant differences were found in the performance of 3-, 4- and 5-year-olds; significant differences were found among the four segmentation tasks; subjects learned from instruction in segmentation; certain tasks were easier than others; and disyllable tasks appeared somewhat easier than monosyllable tasks.
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Abstract

Segmentation Skills of Young Children

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Sixty-eight preschool subjects participated in this investigation of childrens' ability to segment meaningful words. The test consisted of 28 words which were illustrated and presented orally, with appropriate distractors. Instruction was provided for 48 subjects whose performance was below criterion. ANOVAs and post hoc procedures yielded the following results: significant differences were found in the performance of 3- 4- and 5- year olds; significant differences were found among the four segmentation tasks; subjects learned from instruction in segmentation; certain tasks were easier than others; disyllable tasks appeared somewhat easier than monosyllable tasks.

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Segmentation Skills of Young Children

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Objectives. The purposes of this study were to determine whether three-, four-, and five-year-old children can segment words and whether they can profit from instruction in segmentation. Segmentation is defined here as the ability to separate from a given spoken word either the beginning or ending part.

Perspective. While general agreement exists among researchers and educators that childrens' ability to hear and identify discrete linguistic elements (segmenting) is positively related to success in beginning reading (e.g. Savin, 1972; Huttenlocher, 1964), research in this broad area often appears to be confusing and conflicting for the following reasons: 1) Tasks have varied from study to study (e.g. Calfee, Chapman, and Venezky, 1972; Liberman, 1974); 2) Age and ability levels have varied from study to study (e.g. Calfee, Lindamood, and Lindamood, 1973; Bruce, 1964); 3) The languages studied have varied in several studies (e.g. Muraishi, 1972; Elkonin, 1963); and 4) The unit of analysis for segmentation has varied among studies (e.g. Holden and McGinitie, 1974; Rosner, 1974). Further, meaningfulness of the language unit to be segmented seems to play an important role in childrens' ability to segment (Karpova, 1955; Gibson and Levin, 1975).

Method. The subjects in this study were 68 children (16 three-year-olds, 20 four-year-olds and 32 five-year-olds) attending a private preschool and a public kindergarten in a small midwestern city. All subjects received the pre-tests.

Since the children could not read, each item of the test described below was presented orally. First, the alternatives were presented, each with a picture. Then the unsegmented stimulus word was presented. The subjects were asked to choose the picture that represented the segmented word. Testing was done invididually in two sessions of approximately fifteen minutes in a quiet place close to the subjects' classroom.

Phase 2 of the study included only those children who did not attain the criterion of 80 percent correct on the pre-test (16 three-year-olds, 16 four-year-olds, and 16 five-year-olds). Subjects in Phase 2 received instruction in segmentation tasks and a post-test.

Teaching was done with groups of two to four children, in sessions which lasted no more than fifteen minutes. Teaching procedures were similar to but less structured than for testing.

Limitations of this study include the small sample size, which precluded more sophisticated statistical analyses. Since the nursery schools were private, the findings should not be generalized to children from poor families. The most important limitation is the probable ceiling effect of the instrument. Many (about 30 percent) four and five year olds knew the tasks required by the test.

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Data Source. The writers constructed a 28 item test consisting of four subtests, and appropriate practice items. First, a corpus of words was identified. The major criteria for correct and alternative responses were: 1) That it could be safely assumed the words were part of each child's meaningful lexicon, and 2) that the words could be illustrated. Each word on the test was illustrated in pen and ink on paper approximately 8 1/2" x 11" in size.

The four subtests were designed to assess performance on the following tasks:

1. Segmentation of disyllables in final position (treehouse, house).
2. Segmentation of disyllables in initial position (flashlight, flash). All disyllables were compound words.
3. Segmentation of monosyllables in initial position (beet, bee).
4. Segmentation of monosyllables in final position (cold, old).

For each of these tasks, two practice items and seven test items were administered. The attained Chronbach alpha of .9188 indicates that the total test had high internal consistency.

For Phase 1 of this study a 3 x 4 ANOVA was conducted on pre-test data to answer questions regarding the three age groups (3, 4, and 5) and the four segmentation tasks (disyllables, final; disyllables, initial; monosyllables, final; and monosyllables, initial). Planned comparisons of pretest group means related to the three age groups and four tasks were made according to the Newman-Keuls procedure (Winer, 1971).

For Phase 2 of the study a 2 x 3 x 4 repeated measures ANOVA was conducted for subjects receiving instruction and the post-test. The variables investigated were age (3, 4, and 5), task (disyllable, final; disyllable, initial; monosyllable, final; and monosyllable, initial), and measure (pre-test, post-test). Planned comparisons of pretest-posttest group means were made according to the Newman-Keuls procedure (Winer, 1971).

Findings. Means and standard deviations of the segmentation pre-test scores are summarized in Table 1. The analysis of variance on pre-test scores is summarized in Table 2. A significant difference ($p < .01$) was found for age. In general, five-year-olds performed better than four-year-olds, who in turn performed better than three-year-olds. A significant difference ($p < .01$) was found among the four segmentation tasks studied. Interaction was not present between the variables investigated.

The Newman-Keuls procedure yielded the following results: Differences in mean scores of 4 and 5 year olds were nonsignificant, but differences between 3 and 4 year olds and between 3 and 5 year olds were significant at the .01 level of significance. These data suggest that the 4 and 5 year old children had learned a good deal more about segmentation than those in the youngest age group, a reasonable and expected finding.

The Newman-Keuls procedure used for testing differences in the tasks yielded the following results: Compound words were significantly easier ($p < .01$) to segment than were monosyllable words. These data suggest that it was easier for young children to segment compound words containing two independent words than it was to segment a monosyllabic word containing less meaningful units. Initial-final position effects subjected to the Newman-Keuls test were inconsistant. Initial position was easier than final for compound words ($p < .01$) but the reverse was true for monosyllabic words.

Means and standard deviations of pre- and post-test scores of subjects in Phase 2 of the study are summarized in Table 3. Results of the ANOVA are summarized in Table 4. A main effect of measure (pre-post) was found to be significant ($p < .01$), suggesting that the subjects, in general, learned the segmentation tasks in which they were instructed. A significant difference ($p < .01$) among tasks was found, suggesting that subjects learned certain tasks with greater ease than other tasks. A significant difference ($p < .01$) was found among the three age groups, suggesting that different amounts of learning occurred at the age levels investigated. Interactions among the three variables analyzed were nonsignificant.

The Newman-Keuls test on the main effect of age were consistant with the pre-test findings. Differences between 4 and 5 year-olds were nonsignificant, while the difference between 3 and 4 year-olds and 3 and 5 year-olds was significant ($p < .01$). These data suggest that the three year-olds learned more than the 4 and 5 year-old children.

Results of the Newman-Keuls test were relatively clear for analysis of syllabic units. In both pre- and post-tests the subjects scored better on compound (disyllable) words than they did on monosyllabic words, suggesting it is somewhat easier to segment a meaningful unit from two joined meaningful units than it is to segment less meaningful units (e.g. phonemes) from a one syllable word.

Results of the Newman-Keuls test on the position effect was not clear. Initial position in compound words was easier than final position for both pre- and post-tests. The reverse was true for monosyllabic words on both the pre- and post-tests. The reason for this finding is not clear to the investigators.

Conclusions and Implications. Significant differences were found for the age groups in the performance of tasks on pre-tests. Clearly, four- and five-year-olds were more similar than either was to the three-year-olds. It would seem that between the ages of three and four children apparantly learn a great deal about segmentation through maturation.

Pre-test data clearly indicate that some segmentation tasks are easier than others. Generally, disyllable tasks were easier than monosyllable

tasks, especially for the youngest subjects. These data suggest the possible existance of a hierarchy of segmentation tasks. The writers believe this may be due to the additional meaningfulness involved in the particular form of the disyllable words involved in this study (compound words). Such a conclusion seems consistent with what has been suggested by Karpova, Holden and McGinitie and Gibon and Levin. This issue warrants further investigation.

Position effect findings do not appear consistent. When disyllable tasks are considered, the initial position seems easier than the final. In monosyllable tasks, final position seems easier.

Data from Phase 2 of the study, involving a pre-test, instruction and a post-test format indicate that children learned, regardless of age or task, as a result of instruction (and/or maturation, or perhaps, some other, unknown, factor). While the ceiling effect of the instrument must be considered for four- and five-year-olds, the three-year-old children clearly showed the greatest growth from pre- to post-test. Some tasks were easier than others. Scores on the disyllable pre- and post-tests were higher, but children learned more monosyllable tasks. This probably reflects, in part, the ceiling effect of the test. Data regarding position effect and learning are ambiguous and have not been explained by the investigators.

Since learning occurred, which we attribute to instruction, teachers of young children might contribute to childrens' success in initial reading by teaching segmentation tasks at the oral-aural level prior to formal reading instruction.

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Table 1

Means and Standard Deviations of Segmentation Pre-Test Scores

Age Group		Tasks			
		Disyllable Initial	Disyllable Final	Monosyllable Initial	Monosyllable Final
Three	N				
M	16	3.81	3.13	2.56	2.75
SD		1.87	1.45	1.09	1.61
Four					
M	20	6.60	5.40	4.85	5.40
SD		.94	1.67	1.46	1.43
Five					
M	32	6.47	5.97	5.28	6.28
SD		1.39	1.62	1.99	1.35

Table 2

Summary of Analysis of Variance on Pre-test Scores

Source	SS	df	MS	f
Between Subjects	489.61	11	44.51	
A (Task)	61.74	3	20.58	8.77**
B (Age)	419.34	2	209.67	89.38**
AB (Task x Age)	8.52	6	1.42	.61
Subjects within groups	611.00	260	2.35	

** $p < .01$

Table 3

Means and Standard Deviations of Segmentation Pre-test and Post-test Scores

Task	Disyllable Initial			Disyllable Final			Monosyllables Initial			Monosyllables Final		
Age	3	4	5	3	4	5	3	4	5	3	4	5
N	16	16	16	16	16	16	16	16	16	16	16	16
Pre-test												
M	3.81	6.50	6.00	3.13	5.32	5.06	2.56	4.90	3.88	2.75	5.06	5.63
SD	1.87	1.01	1.86	1.45	1.70	1.88	1.09	1.42	2.00	1.61	1.43	2.08
Post-test												
M	5.19	6.75	6.75	4.56	6.44	6.63	4.00	5.75	5.25	4.38	5.88	6.00
SD	1.60	.44	.58	2.10	.94	.81	1.86	1.31	1.77	2.06	1.35	1.71

Table 4

Summary of Analysis of Variance on Pre-test Post-test Scores

Source	SS	df	MS	f
Between				
A (Task)	112.089	3	37.363	11.72**
B (Age)	325.1	2	162.55	50.98**
AB (Task x Age)	10.464	6	1.744	.55
(E)	586.592	184	3.188	
Within	445.312	196	2.272	
C (Pre vs. Post)	122.248	1	122.248	74.97**
AC (Task x pre-post)	7.131	3	2.377	1.46
BC (Age x pre-post)	6.4	2	3.20	1.96
ABC (Task x Age x pre-post)	6.18	6	1.03	.63
(E)	299.92	184	1.63	

** $p < .01$